

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
10 May 2007 (10.05.2007)

PCT

(10) International Publication Number
WO 2007/051473 A1

(51) International Patent Classification:
B08B 7/02 (2006.01) B08B 5/02 (2006.01)
B08B 3/02 (2006.01)

(21) International Application Number:
PCT/DK2006/000605

(22) International Filing Date:
1 November 2006 (01.11.2006)

(25) Filing Language: Danish

(26) Publication Language: English

(30) Priority Data:
PA 2005 01505 1 November 2005 (01.11.2005) DK

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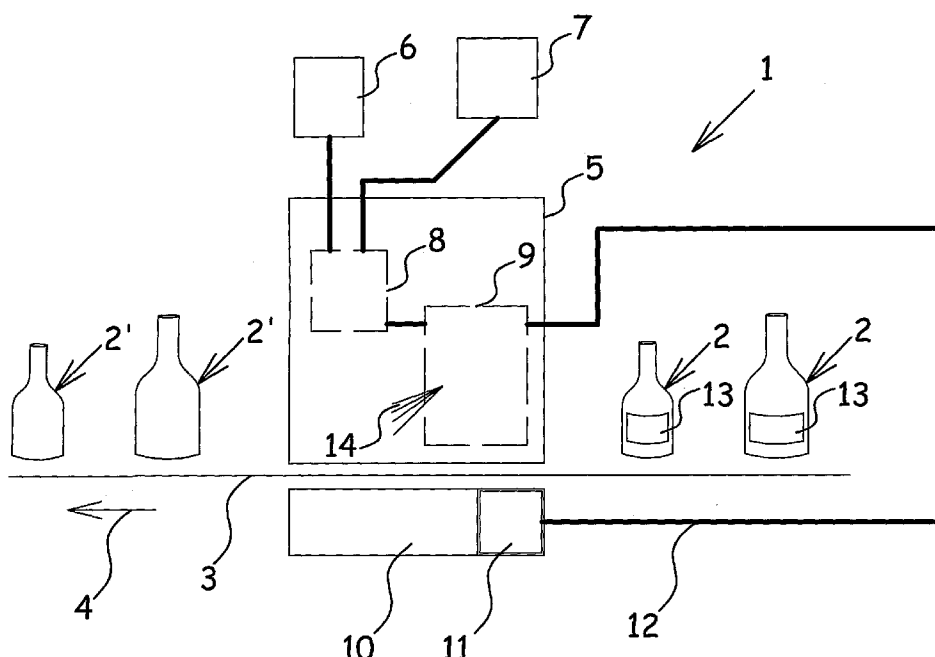
(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: A METHOD FOR CLEANING PACKAGING ITEMS



(57) Abstract: There is disclosed a method for cleaning packing items 2, preferably glass bottles. The cleaning is effected by high-pressure cleaning, while using a high-pressure medium containing an abrasive. In order to provide a particularly environmentally friendly and efficient cleaning, where labels 13, glue residue and surface coating are removed, a glass powder is applied which is injected into a high-pressure medium. A jet 14 of glass powder containing high-pressure medium is directed towards the packing item. The glass powder will be pulverized to a grain size which is preferably between 30 and 50 micrometer.

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A Method for Cleaning Packaging Items

Field of the Invention

The present invention concerns a method for cleaning packing items, preferably glass bottles, by high-pressure cleaning with the application of a high-pressure medium
5 containing an abrasive.

Packing items or containers will need a cleaning if they are to be reused. This is the case with containers of many types, e.g. containers for colouring materials, foodstuff, beverages and the like.

10

Methods for cleaning packing items with the purpose of recycling are known.

The prior art methods have been associated with problems with regard to depositing waste in the form of worn out high-pressure medium and abrasive.

15

In particular, the invention has the possibility for application in connection with a returnable bottle system and may be used in recycling works, bottle cleaning facilities and the like, where packing items are collected with the object of reusing. Here, there is a possibility of central cleaning of the packing items while at the same time
20 effecting sorting of collected bottles/packing items.

25

Initially, reuse of packing was introduced with the intent of saving resources for the packing. However, there is an increased focus on the environment and a regard to the disposition of cleaning agents used at the cleaning. Also, the water consumption by
25 flushing/cleaning of packing/bottles is a resource which is desirable to reduce.

25

Previously, there are examples of cleaning packing items, e.g. glass bottles, where high-pressure cleaning is used alone or combined with traditional prior art methods where bottles are flushed internally and externally by using flushing vessels. Examples
30 of this are known from the following documents: US 5,322,532, US 6,113,478, DE 197 09 621 A1, WO A1-03/070391, JP 07013555 and JP 03321777.

30

Through many years, a great effort has thus been made in order to find alternative methods for cleaning packing items for removing paint, labels, glue residue and the like.

5 As an alternative to the high-pressure cleaning, experiments with mechanical cleaning with brushes and the like have been performed for removing glue remains and surface coatings which are difficult to remove by high-pressure cleaning/chemical treatment. However, it has appeared that such mechanical cleaning gives rise to scratches, causing that the packing items cannot be reused.

10

It is thus desirable to indicate a method whereby the packaging items can be cleaned efficiently without any risk of damaging the packing items, where the amount of waste produced by the cleaning can be reduced. This is achieved according to the present invention with a method of the kind mentioned in the introduction, which is peculiar
15 in that glass powder is injected into the high-pressure medium and that a jet of glass powder containing high-pressure medium is directed towards the packing item.

It has appeared possible that packing items in the shape of bottles may be cleaned in an efficient way by high-pressure flushing with glass powder admixed in the high-
20 pressure medium. As high-pressure medium water is preferably used, but other media may also be applied.

By the word "glass powder" is meant glass which is crushed so that it appears with a very small grain size, which preferably will be less than 100 micrometer, and
25 preferably having a grain size between 30 and 50 micrometer.

In practice, the method may be performed in a sorting and cleaning facility in a recycling works. Packing items, which are preferably not sorted, may thus be introduced to a processing unit in which the method is performed.

30

In connection with removing labels, it is particularly glue that is difficult to remove. It is particularly difficult to remove glue from self-adhesive labels.

As these labels are the cheapest to use for a consumer, these labels will be most widely applied on bottles.

5 By performing a high-pressure cleaning with a mixture of water and glass powder, it has appeared possible to remove labels and glue residues. Furthermore, it has appeared that removal of surface coating on the bottles is also effected. By the previous use of chemicals in the form of leaching agents and other, the bottles have been provided a bluish tinge which has hitherto been removed by mechanical cleaning. This surface coating is cleaned by the method according to the invention. It would thus be possible
10 to perform a considerable reduction in the consumption of the chemicals used, or - which are to be used, in the cleaning of bottles. In practice it has appeared feasible that a saving of up to 5% of the used chemicals can be obtained, with a corresponding saving of water used for applying the chemicals. This entails a significant reduction in the environmental load.

15

Furthermore, the used glass powder can be recycled and reused many times. When the glass powder is to be discarded, it will be possible to send it to a glass works where it is remelted together with shards and other things for making new glass.

20 In connection with recycling, paper can be sorted off concurrently with the cleaning of the packing items. These waste products will be unavoidable, irrespectively of the method used for cleaning. These residual products may be sent to incineration as common combustible waste.

25 Water used as high-pressure medium may be reused many times. In practice, the method may only require use of a small amount of water, as there may be applied a mixing ratio for high-pressure medium/water and glass powder between 1-10 and 4-10, preferably between 1-10 and 2-10. This means that the method only requires use of a very limited amount of water.

30

The method will be performed by high-pressure cleaning, which is performed at a pressure between 100 and 180 bar, preferably between 130 and 150 bar. These pressures may be established in traditional equipment for high-pressure cleaning. The

only special requirements to the used equipment will thus be wearing parts, such as nozzles and the like.

5 During the cleaning, the glass powder containing high-pressure medium may be directed at right angles against the surface of a packing item, but it is preferred using an angle between 2° and 85°, preferably between 30° and 50°. Hereby may be obtained combined high-pressure cleaning and “peeling off” of material from the surface of the packing item.

10 By the method is provided a relative movement between the packing item and the jet of glass powder containing high-pressure medium. This relative movement can e.g. be established by packing items being passed by a nozzle. The packing items may possibly be rotated during such passage. Alternatively, a unit may be displaced while the packing item is kept stationary.

15

By cleaning glass bottles it is preferred that it is the glass bottles which on a conveyor belt or similar are passed by/through a unit for the high-pressure cleaning.

20

If the packing items are pre-flushed in a water bath or steam bath prior to the high-pressure cleaning, it will thus be possible to remove part of the particles on the surface of the packing item, so that the high-pressure cleaning can only be used for particles which are difficult or impossible to remove by traditional processing in water bath or steam bath.

Description of the Drawing

25

The invention will now be explained in more detail below with reference to the accompanying drawing that shows a schematic view of a unit for use in performing the method according to the invention.

Detailed description of the invention

30

A processing unit 1 for performing the method is shown in the drawing. Packing in the form of bottles 2 with different shapes are conveyed by a conveyor belt 3 in direction of the arrow 4 through a cleaning station 5. The cleaning station 5 is connected to a source 6 of water and a source 7 of glass powder. The sources 6, 7 are connected with

a high-pressure unit 8 in the cleaning station 5. The high-pressure unit 8 is connected with a flushing device 9 that contain a nozzle arrangement which may provide a jet 14 of glass powder containing high-pressure medium, which is directed against the bottles 2 when they pass through the cleaning station 5. More nozzles may be used for establishing a plurality of such jets 14. The processing unit 1 is shown with a schematically drafted collecting box 10 disposed under the cleaning station 5 for collecting glass powder containing high-pressure medium and cleaned off material. The collecting box 10 includes a filter unit 11 which may be used for sorting off larger particles and impurities. The filtered high-pressure medium containing glass powder is returned via a return line 12 to the flushing device 9. In practice, the treating unit 1 will primarily will function by recirculating glass powder containing high-pressure medium, and new water and glass powder will only be added to the extent in which it is necessary with regard to the wear occurring during use.

As it appears, bottles 2 processed by the method may include labels 13 which are removed in the cleaning station 5. Bottles 2' leaving the cleaning unit 1 will hereby appear without label, glue residue and surface coating.

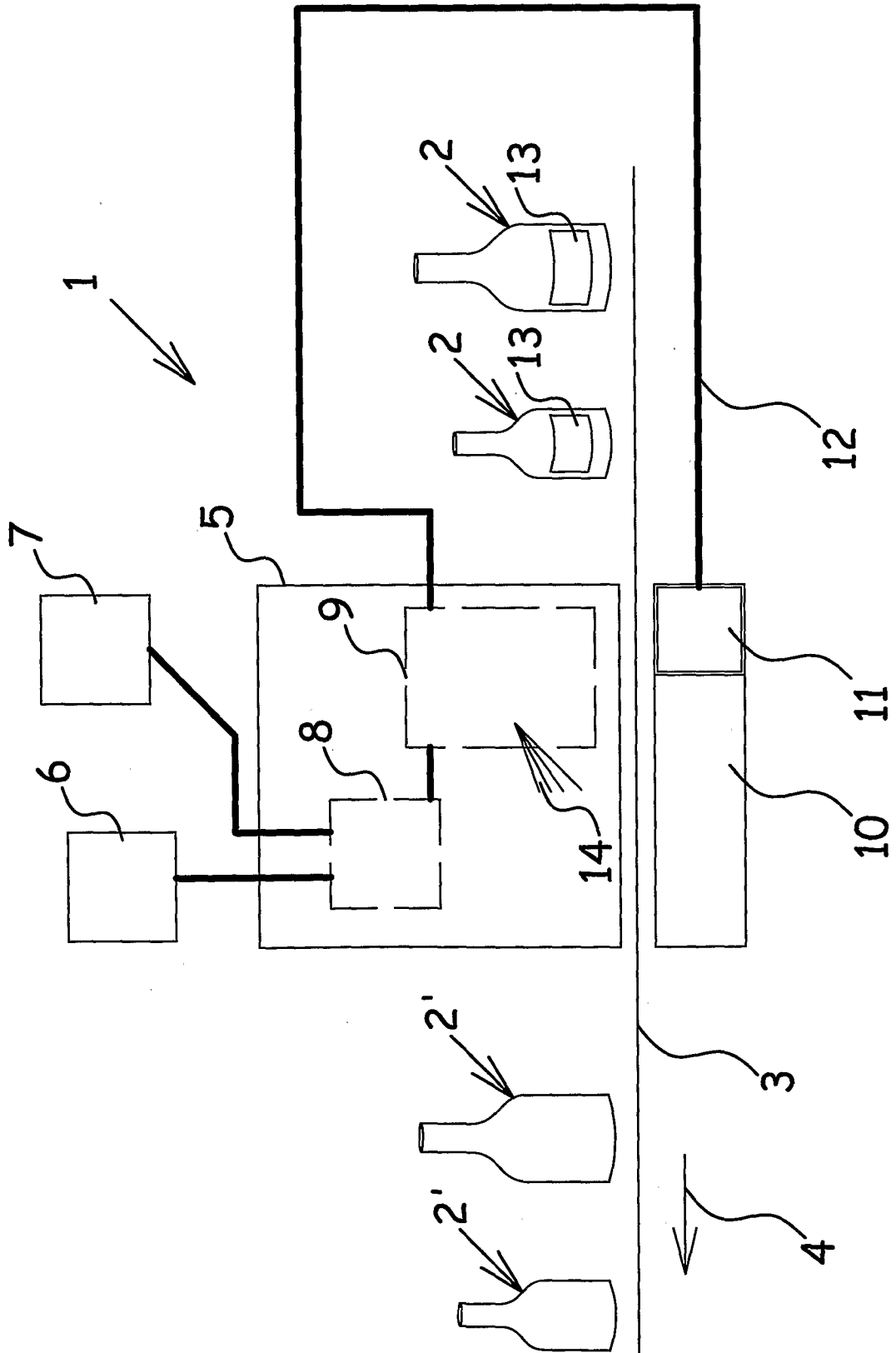
Prior to passage through the processing unit, the bottles 2 can be flushed in a traditional way for internal cleaning. Alternatively, such flushing may be performed in a subsequent step.

Claims

1. A method for cleaning packing items, preferably glass bottles, by high-pressure cleaning with the application of a high-pressure medium containing an abrasive, **characterised in that** glass powder is injected into the high-pressure medium and that
5 a jet of glass powder containing high-pressure medium is directed towards the packing item.
2. Method according to claim 1, **characterised in that** the glass powder is pulverized down to a grain size of less than 100 micrometer, preferably to a grain size between 30
10 and 50 micrometer.
3. Method according to claim 1 or 2, **characterised in that** the high-pressure medium is water.
- 15 4. Method according to any preceding claim, **characterised in that** the high-pressure cleaning is performed at a pressure between 100 and 180 bar, preferably between 130 and 150 bar.
- 20 5. Method according to any preceding claim, **characterised in that** the glass powder containing high-pressure medium is directed towards the surface of the packing item under an angle between 2° and 85°, preferably between 30° and 50°.
- 25 6. Method according to any preceding claim, **characterised in that** a relative movement between the packing item and the jet of glass powder containing high-pressure medium is provided during the cleaning.
7. Method according to any preceding claim, **characterised in that** the packing items are pre-flushed in a water bath or vapour bath preceding the high-pressure cleaning.
- 30 8. Method according to any preceding claim, **characterised in that** the glass powder containing high-pressure medium is recirculated and reused, as larger particles removed at the cleaning are preferably sorted off.

9. Method according to any preceding claim, **characterised in that** labels, glue and surface coating are removed from the packing item.
10. Method according to any preceding claim, **characterised in that** a mixing ratio for the high-pressure medium and the glass powder between 1 - 10 and 4 - 10, preferably between 1 - 10 and 2 - 10, is used.

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/DK2006/000605

A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: B08B, B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	DATABASE WPI Week 199642 Derwent Publications, Ltd., London, GB; Class G03, AN 1996-416516 abstract & JP 8202269 A (MITSUBISHI JUKOGYO KK) 08 August 1996 (1996-08-09)	1-10
	--	
Y	US 4716690 A (J. SZÜCS), 5 January 1988 (05.01.1988), whole document	1-10
	--	
A	US 5364474 A (J.F. WILLIFORD, JR.), 15 November 1994 (15.11.1994), whole document	1-10
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 Further documents are listed in the continuation of Box C. See patent family annex.

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Date of the actual completion of the international search

29 January 2007

Date of mailing of the international search report

29-01-2007

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/DK2006/000605

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 3090392 A (H.H. LIBBY), 21 May 1963 (21.05.1963), whole document --	1-10
A	DE 4003324 A1 (BEHAS SANDSTRAHLSYSTEME GMBH), 8 August 1991 (08.08.1991), abstract --	1-10
A	DE 19709621 A1 (JARMERS H.), 17 Sept 1998 (17.09.1998), abstract -- -----	1-10

International patent classification (IPC)

B08B 7/02 (2006.01)

B08B 3/02 (2006.01)

B08B 5/02 (2006.01)

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Paper copies can be ordered at a cost of 50 SEK per copy from PRV InterPat (telephone number 08-782 28 85).

Cited literature, if any, will be enclosed in paper form.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/DK2006/000605

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